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Chen

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(54) **OPTICAL IMAGING LENS ASSEMBLY, IMAGE CAPTURING UNIT AND ELECTRONIC DEVICE**

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CPC ***G02B 13/0045*** (2013.01); ***G02B 9/60*** (2013.01); ***H04N 5/232*** (2013.01)

(58) **Field of Classification Search**
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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2013/0016278	A1*	1/2013	Matsusaka	G02B 13/18 348/360
2013/0107375	A1*	5/2013	Huang	G02B 13/0045 359/714
2016/0004042	A1*	1/2016	Kubota	G02B 9/62 359/713

FOREIGN PATENT DOCUMENTS

JP	2014178624	9/2014
JP	2015001644	1/2015
JP	2015022152	2/2015
TW	I479187	4/2015

* cited by examiner

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(57) **ABSTRACT**

An optical imaging lens assembly includes, in order from an object side to an image side, a first lens element, a second lens element, a third lens element, a fourth lens element and a fifth lens element. The first lens element with negative refractive power has an image-side surface being concave in a paraxial region thereof. The second lens element has positive refractive power. The third lens element has negative refractive power. The fourth lens element with negative refractive power has an object-side surface being concave in a paraxial region thereof. The fifth lens element with positive refractive power has an object-side surface being convex in a paraxial region thereof and an image-side surface being concave in a paraxial region thereof, wherein the image-side surface of the fifth lens element has at least one convex shape in an off-axis region thereof, and both surfaces thereof are aspheric.

26 Claims, 14 Drawing Sheets